

Replantation as an Alternative for Multiple Impacted Anterior Teeth After Failed Exposure Surgery

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ABSTRACT

Background: Impacted anterior teeth are commonly managed with orthodontic treatment combined with surgical exposure. However, this approach may be ineffective in cases with unfavorable tooth angulation or prolonged treatment duration. This case report presents dental replantation as an alternative treatment for impacted maxillary anterior teeth.

Case: A 17-year-old female patient presented with impacted maxillary lateral incisor and canine that had undergone previous orthodontic treatment and exposure surgery without satisfactory results. Odontectomy was performed to remove the impacted teeth intact, followed by dental replantation after minimal crown adjustment. Interdental fixation using an arch bar was applied, and a synthetic alloplastic bone graft was placed around the roots to support bone healing. The replanted teeth were positioned in underocclusion within the maxillary arch. Clinical and radiographic follow-up at 60 days and one year demonstrated satisfactory healing, good stability, and the absence of infection or pathological findings.

Conclusion: Dental replantation may be considered as an alternative treatment option for impacted anterior teeth in selected cases, taking into account factors such as tooth position, available space, patient age, and oral hygiene status to achieve favorable outcomes.

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INTRODUCTION

Impacted teeth are defined as teeth that fail to erupt into the dental arch within the expected developmental period. The overall prevalence of impacted permanent teeth has been reported to range between 5% and 18%, with the mandibular third molar being the most frequently affected tooth.¹ Anterior impacted teeth are less common, accounting for approximately 1–3% of all impacted teeth, and maxillary anterior impactions are reported more frequently in female patients.² Multiple impacted anterior teeth are relatively rare and present greater clinical challenges due to their impact on esthetics, occlusion, and dental arch integrity.³

Several studies have reported varying prevalence rates of impacted anterior teeth across different populations. Impacted maxillary canines have been reported with a prevalence ranging from 0.9% to 2.2%, while cases involving multiple impacted teeth are relatively uncommon and often associated with systemic conditions such as cleidocranial dysplasia or Gardner's syndrome.⁴ In certain populations, the overall prevalence of impacted teeth has been reported to reach up to 28.3%, although detailed epidemiological data regarding multiple impacted anterior teeth remain limited.⁵

Orthodontic-based studies have further highlighted the predominance of maxillary anterior involvement. Zhou et al. reported that impacted teeth were present in approximately 7.26% of patients attending orthodontic specialty clinics, with nearly 70% of these cases involving maxillary anterior teeth, emphasizing the clinical relevance of anterior impactions.⁶ Demographic analyses have also suggested age- and sex-related trends, with impacted incisors more frequently observed in younger patients and a higher incidence reported in males, particularly during the mixed dentition period.⁷

The management of impacted anterior teeth is often challenging, particularly when unfavorable angulation, horizontal positioning, or overlap with adjacent teeth is present. Conventional treatment typically involves surgical exposure combined with orthodontic traction to guide the impacted tooth into the dental arch.^{8,9} However, this approach requires adequate space, favorable tooth angulation, and prolonged treatment duration. In cases with severe tooth inclination or horizontal positioning, orthodontic traction may fail or result in unpredictable outcomes.

Odontectomy is commonly indicated for impacted teeth with a poor prognosis for orthodontic eruption. Although removal of the impacted tooth can eliminate local symptoms, odontectomy alone results in tooth loss and often necessitates prosthetic replacement using dental implants or removable dentures.¹⁰ In young patients, particularly in the esthetic anterior region, implant placement may be limited by ongoing craniofacial growth, insufficient alveolar bone volume, and high esthetic demands. Removable dentures may also present functional limitations and compromised esthetics. These limitations highlight the need for alternative treatment approaches, especially in cases involving multiple impacted anterior teeth.

Dental replantation has been widely applied in the management of dentoalveolar trauma, particularly avulsed teeth, with the aim of preserving the patient's natural dentition.¹⁰ The use of the patient's own tooth offers several advantages, including better adaptation to occlusal forces, preservation of periodontal ligament function, maintenance of alveolar bone volume, and superior esthetic outcomes compared to prosthetic replacements.¹¹

Despite its potential advantages, dental replantation is considered a technique-sensitive procedure with several biological and mechanical challenges. The long-term success of replantation is influenced by multiple factors, including the condition of the periodontal ligament, extra-alveolar time, degree of surgical trauma during

tooth removal, and the stability of the replanted tooth during the healing phase.^{12–15} In cases involving impacted teeth, these challenges may be amplified due to the need for surgical removal, crown modification, and repositioning within the dental arch, which can increase trauma to the periodontal ligament and surrounding tissues.^{16,17} In addition, bone defects created during odontectomy may compromise initial stability and increase the risk of root resorption or ankylosis if not properly managed.^{18,19} Therefore, careful case selection and the use of adjunctive measures to enhance stability and bone healing are critical for achieving favorable outcomes in dental replantation.^{13,20}

In the present case, replantation was performed as an advanced modification of odontectomy to manage multiple impacted maxillary anterior teeth with unfavorable positioning and a history of failed orthodontic and exposure treatment. The impacted teeth were carefully removed intact and replanted to restore function and esthetics while minimizing bone loss. Bone graft material was applied around the replanted teeth to compensate for extraction-related bone defects, enhance initial stability, and promote bone regeneration through osteogenic differentiation.²¹ This approach aimed to reduce potential complications associated with tooth loss and provide a biologically favorable outcome in a young patient.

CASE REPORT

A 17-year-old female patient complained of missing front teeth with protrusions on the gums of the edentulous area. The patient had been under orthodontic treatment for over three years and had undergone exposure surgery by pulling out of a retained tooth without satisfactory results. The patient hoped to extract the retained tooth, so that the protrusion in the edentulous area could be eliminated and then planned to use a denture.

On clinical examination, the patient had edentulous areas 22 and 23 with hard protrusion of the buccal gingiva. Radiological examination showed that teeth 22 and 23 were impacted with overlapping images. The angulation of the crown of tooth 23 towards the mesial intersects with the crown of tooth 22 which is inclined apically towards the palate. The patient had no history of systemic disease and denied any history of allergies.

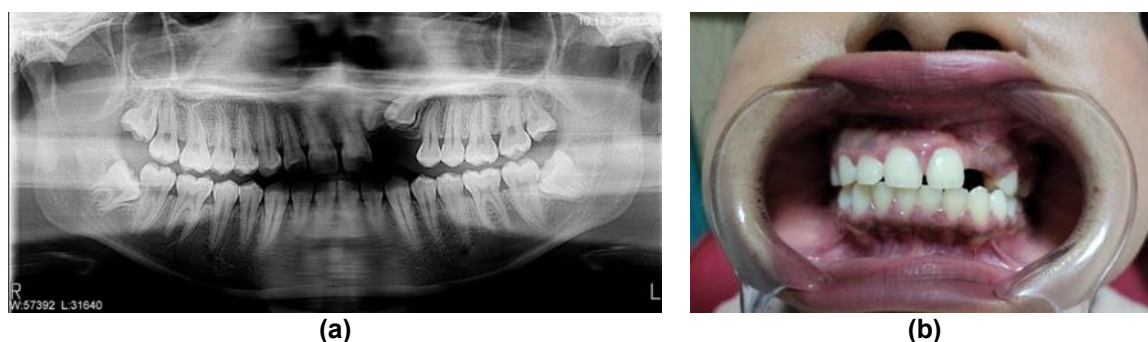


Figure 1 Clinical and radiologic photos of preoperative patients.

The patient was informed about the advantages and disadvantages of the odontectomy procedure as well as the alternative option of performing a dental replantation procedure using the impacted teeth. Replantation consideration was taken considering the space available for teeth 22 and 23. The replantation procedure was then carried out after the patient gave consent for medical treatment.

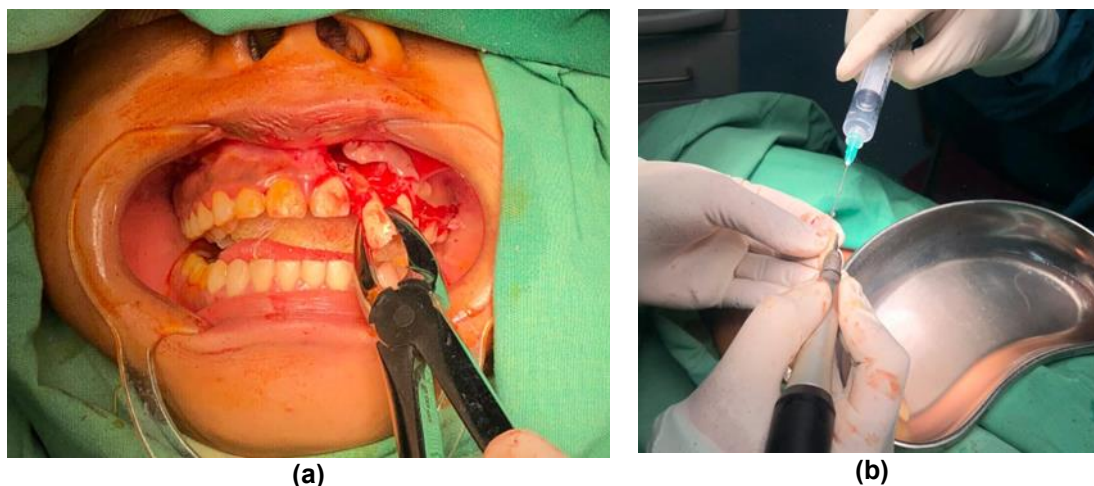


Figure 2 Odontectomy of teeth 22 and 23 and mesial distal grinding of teeth 22 and 23

The odontectomy and replantation procedure was performed under general anesthesia. The triangular flap was created in regions 22 to 26, and buccal bone reduction in regions 22 to 23 was kept to a minimum. Teeth 22 and 23 were removed one by one intact and then soaked in saline solution. Reduction of the distal medial of teeth 22 and 23 was carried out on the crown to a minimum with the aim that the two teeth could be placed in a position that suited the maxillary arch.

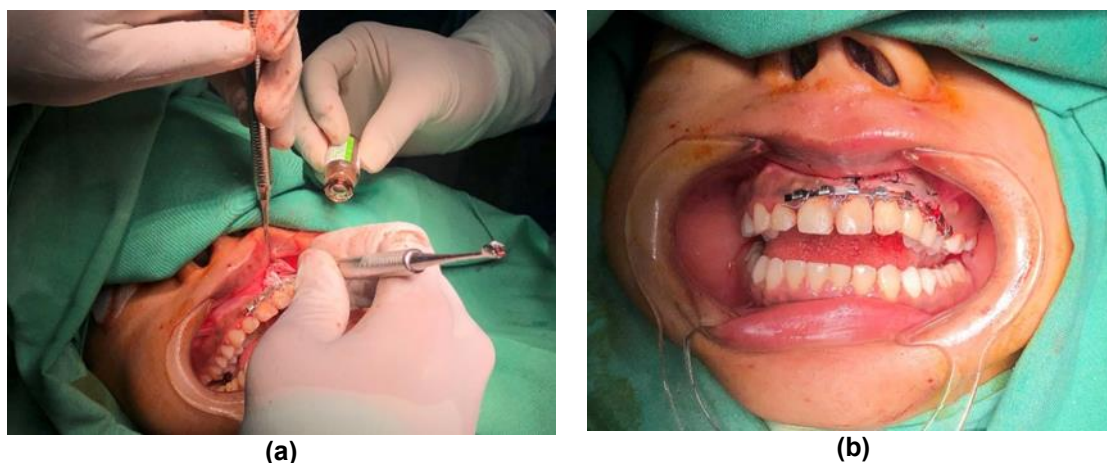


Figure 3 Bonefill brand bone graft application followed by fixation using arch bar

Interdental fixation was performed using arch bars in regions 11 to 25. The position of replanted teeth was placed under occlusion and ensured that they did not contact the mandibular antagonist teeth. Bonefill brand synthetic bone graft application was given to close the bone reduction defect that occurred during the odontectomy procedure. The flap closure was done as tightly as possible so that no bone graft material leaked out.

Postoperatively, the patient was prescribed amoxicillin 500 mg three times daily for 3 days and mefenamic acid 500 mg three times daily for 3 days. The patient was instructed to consume soft foods and to avoid biting using the replanted teeth 22 and 23. Oral hygiene instructions were provided, including routine tooth brushing and the use of 0.5% chlorhexidine mouthwash. The patient was also advised to consume calcium and vitamin D3 supplements to support hard tissue healing.



Figure 4 Panoramic photograph of the patient one week postoperatively

Observation on postoperative day 7 showed good flap closure wound healing. There were no signs of dehiscence and infection in the postoperative area. The patient had good oral hygiene but had a gingival recession in region 23. The patient had minimal pain and minimal swelling. The aff hacting procedure was performed and controlled the strength of the interdental fixation to be maintained for the next two weeks. The radiologic examination revealed an excellent periapical tissue picture, with no signs of infection around the roots of 22 and 23 teeth.



Figure 5 Clinical photo of the patient after removal of arch bar fixation

The patient following control was done on the 30th postoperative day, clinical examination showed minimal unsteadiness in teeth 22 and 23. The procedure continued by removing the arch bar fixation using local anesthesia. The patient was educated to maintain a good diet by avoiding biting on teeth 22 and 23.

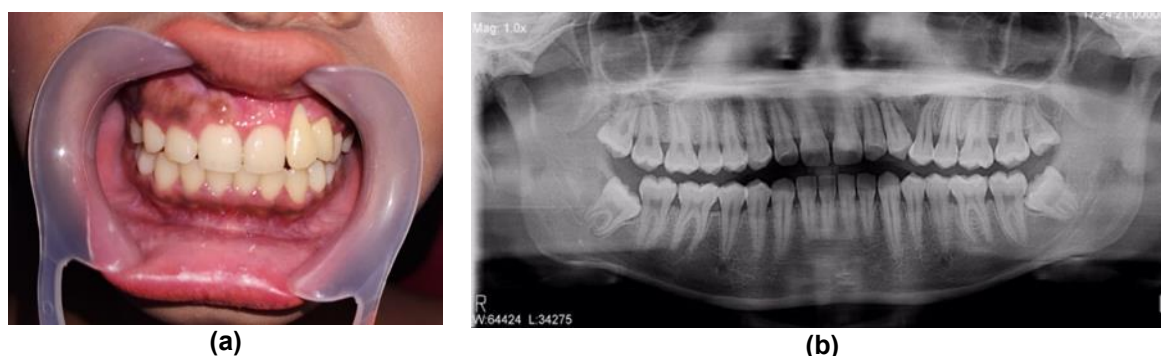


Figure 6 Clinical and panoramic photographs of the patient two months post-replantation

A follow-up was conducted on the 60th postoperative day, evaluating tooth unsteadiness and radiology examination. The patient had no specific complaints about the replanted tooth. On clinical examination, the gingival recession of region 22 was found with no radiological picture of infection in teeth 22 and 23. Education to maintain oral hygiene was maintained, and advised to control if there were complaints about the replanted teeth immediately. One year postoperatively, the patient was again clinically evaluated. The patient did not complain of problems with the replanted teeth. The patient is quite satisfied with the results achieved.



Figure 7 Clinical evaluation one year postoperatively

DISCUSSION

In this case report, dental replantation was performed as an alternative treatment for impacted maxillary anterior teeth that could not be successfully managed with conventional orthodontic traction and surgical exposure. The impacted teeth were removed through odontectomy and replanted to restore function and esthetics while preserving the patient's natural dentition. Previous studies have reported that the success of tooth replantation is influenced by biological and technical factors, including surgical trauma, extra-alveolar time, periodontal ligament preservation, and stabilization methods.^{22,23}

One of the most common biological consequences following tooth replantation is pulp necrosis, which occurs due to disruption of the neurovascular supply during extraction and reinsertion of the tooth. Teeth with complete root formation are particularly susceptible to pulpal necrosis, necessitating careful postoperative monitoring. Endodontic treatment is indicated when clinical symptoms or radiographic signs of periapical pathology develop.²⁴ In the present case, no clinical or radiographic signs of pulpal pathology were observed during the one-year follow-up period.

External root resorption and ankylosis represent the most detrimental complications affecting the long-term prognosis of replanted teeth. External inflammatory resorption may occur when periodontal ligament damage is accompanied by bacterial contamination, whereas replacement resorption (ankylosis) results from extensive loss of viable periodontal ligament cells, allowing direct fusion between alveolar bone and root surface. These conditions can compromise tooth mobility and, in growing patients, may lead to infraocclusion.²⁵ Preservation of periodontal ligament vitality, minimal extra-alveolar time, and adequate initial stabilization are essential to reduce the risk of these complications.^{1,25}

Gingival recession was observed clinically in this case, particularly in the anterior region. This condition may be related to surgical flap design, thin gingival biotype, and alterations in soft tissue architecture following replantation. Gingival recession after surgical intervention may be managed through meticulous plaque control, long-term clinical monitoring, and periodontal plastic surgical procedures when esthetic or functional demands

require intervention.²⁶ In the present case, the recession was mild and did not adversely affect patient comfort or satisfaction.

The use of synthetic alloplastic bone graft material in this case aimed to compensate for bone defects created during odontectomy and to enhance the initial stability of the replanted teeth. Hydroxyapatite-based grafts provide osteoconductive scaffolding, supporting angiogenesis and new bone formation around the replanted roots.^{21,26} Adequate bone support contributes to reduced micromovement, which is critical in preventing periodontal breakdown, resorption, and ankylosis. Clinical and radiographic evaluation at 60 days and one year postoperatively demonstrated satisfactory stability and absence of pathological findings.

This case report has several limitations. As a single-case observation, the findings cannot be generalized to all impacted anterior teeth cases. Although a one-year follow-up showed favorable outcomes, longer observation periods are required to detect late complications such as progressive root resorption or ankylosis. In addition, pulp vitality testing and histological evaluation were not performed. Further prospective studies with larger sample sizes and extended follow-up are necessary to clarify the long-term predictability of dental replantation for impacted anterior teeth.

CONCLUSIONS

Dental replantation can serve as a viable alternative treatment for impacted anterior teeth when conventional orthodontic and surgical exposure approaches fail. In this case, replantation following odontectomy successfully restored function and esthetics while preserving the patient's natural teeth and alveolar bone. With careful case selection, atraumatic handling, adequate stabilization, and proper postoperative management, dental replantation may provide a predictable outcome, particularly in young patients with multiple impacted anterior teeth and high esthetic demands.

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